

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 January 2002 (03.01.2002)

PCT

(10) International Publication Number
WO 02/01312 A2

(51) International Patent Classification⁷: **G06F**
(21) International Application Number: PCT/CN01/01062
(22) International Filing Date: 28 June 2001 (28.06.2001)
(25) Filing Language: English
(26) Publication Language: English
(30) Priority Data:
60/214,812 28 June 2000 (28.06.2000) US
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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

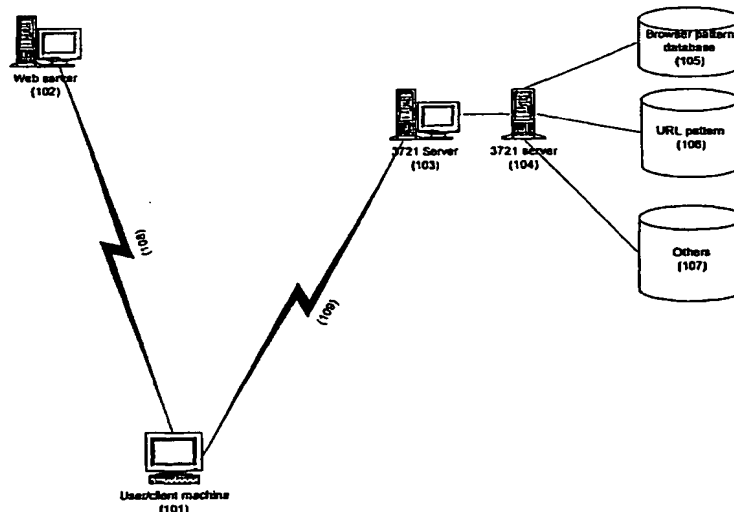
Published:

— without international search report and to be republished upon receipt of that report

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND SYSTEM OF INTELLIGENT INFORMATION PROCESSING IN A NETWORK



(57) Abstract: A method and system of intelligent information processing in the Internet comprises identifying whether an input is one of a URL address, English words, native language characters, and native language pronunciation notations. If the input is a regular URL, the system queries the input in a corresponding server through the Internet, and directly obtains the query result therefrom. If the input includes the native language pronunciation notations, the system parses the input against at least one phonetic spelling word list to find out corresponding Internet keyword, and then fetches a corresponding query result; and if the input includes characters of a native language, the system processes the input as a natural language input in a natural language table, and obtaining a desired Internet keyword, and fetches a corresponding query result of website URL.

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METHOD AND SYSTEM OF INTELLIGENT INFORMATION PROCESSING IN A NETWORK

FIELD OF INVENTION:

- 5 The present invention relates to a method and system of intelligent information processing in a wide area network, such as Internet, through native language, such as Chinese. More particularly, it relates to a method and system of Chinese intelligent search in the Internet.

10 BACKGROUND OF THE INVENTION

- A Network is a distributed communicating system of computers that are interconnected by various electronic communication links and computer software protocols. A WAN (wide area network) is a geographically dispersed telecommunications network and the term distinguishes a broader telecommunication structure from a local area network (LAN). A wide area network may be privately owned or rented, but the term usually connotes the inclusion of public (shared user) networks. A particularly well-known WAN is the international information infrastructure, commonly called the Internet. The Internet is a worldwide network whose Electronic Resources include (but are not limited to) text files, graphic files in various formats, World Wide Web "pages" in HTML (Hyper Text Mark-Up Language) format or various extensions, including XML, files in various and arbitrary binary formats, and electronic mail addresses. As in many other networks, the scheme for denotation of an Electronic Resource on the Internet is an "electronic address" which uniquely identifies its location within the network and within the computer in which it resides.

- On the Internet, for example, such an electronic address is called a Universal Resource Locator or URL, and consists of a specially formatted concatenation of information about the type of protocol needed to access the resource, a Network Domain identifier, identification of the particular computer on which the Electronic Resource is located, a port number, directory path information within the computer's file structure, and the file name of the resource. Internet URLs and similar denotation schemes for Electronic Resources are cumbersome for

human users. URLs are often more than 50 characters long and contain information that is neither interesting nor meaningful to seekers of information. Thus, some works have been done to make the search of web addresses under URL more meaningful to the information seekers or searchers. That is
5 the seekers or searchers do not have to remember the exact URLs in the search engines, but some naturally used words or terms.

U. S. Patent No. 5,764,906 describes a system for providing and maintaining short aliases for information resources and their providers and a system for
10 translation of these aliases to meaningful electronic addresses, such as URL's, facsimile and voice telephone numbers and electronic mail addresses, and for accessing the resources by means of these addresses. Similarly, PCT application WO 99/39275, published on August 5, 1999 describes a method of navigating the Internet to a resource based upon a natural language name, to
15 a resource that is stored in a network and identified by a location identifier. Certain software products have become commercially available to assist the access of Internet resources using natural language names.

At present, many of such services are available. For instance, RealNames
20 (Central Co. <http://www.realnames.com>) substitutes short "keywords" for complicated Internet addresses, or URLs, and has already offered its service through Microsoft's Internet Explorer Web browser and MSN Web portal. Microsoft also announced the inclusion of RealNames in its Web browser software. RealNames' service is an Internet equivalent to America Online's
25 popular keyword system, part of its proprietary online service. The system allows AOL members to type a common phrase to find specific content channels. Similarly, Netword Agent software (<http://www.netword.com>) also allows a user to enter Internet keyword instead of a URL. In addition, Internet Engineering Task Force (IETF) is developing an Internet keywords standard.
30 The IETF already has formed a working group devoted to devising a "common name resolution protocol," or a standard way of implementing Web keywords.

However, the Internet keyword software products, such as those from RealNames or Netword, are either incorporated to a browser or as a plug-in for

the browser. Generally, when a new version of the browser is released, the plug-in software must also be updated.

Furthermore, the Internet keyword software products or keyword searches are
5 either not suitable or cumbersome for processing certain native language, such
as Asian languages, particularly Chinese, Japanese and Korean, or any other
pictographic languages. Each character may not have an exact meaning, and
may have various meanings when being combined with one or more other
characters. Therefore, normal keyword search techniques cannot be used to
10 obtain quickly and accurately desired search results of such electronic
addresses.

It is then an object of the present invention to provide a method of processing
search inquiries in native languages, such as Chinese.

15

It is another object of the present invention to provide a system of information
processing in the Internet using native languages, such as Chinese.

It is a further object of the present invention to provide a method and system of
20 Chinese intelligent search in the Internet, either based on the characters or
based on "pinyin" that is the pronunciation of the characters.

It is still a further object of the present invention to provide a method and
system of Chinese intelligent search in the Internet, automatically obtaining
25 correct results even if the pinyin is entered with southern accent.

SUMMARY OF THE INVENTION

In accordance with the present invention, a method and system of intelligent
search in the Internet comprises identifying whether the input is one of a URL
30 address, native language characters, and native language pronunciation
notations. If the input is a regular URL, the text input is queried in a domain
name server and the query result is sent back to the browser. If the input
includes characters of a native language, the input is processed as a natural
language input. The search inquiry will be sent to the search engine, either

remote or local, that performs an intelligent search based on the native language characters. The search result will be sent back to the browser, indicating the desired URL or web-address.

5 If the input is determined as the native language pronunciation notations, i.e., phonetic spellings, it will be further determined whether the input is a full pronunciation notation (phonetic spelling) or abbreviations of first letters of the pronunciation notation. If the input is a full pronunciation notation query, the query will be processed in the pronunciation notation search table to obtain the
10 desired URL or web-address, and the result will be sent back to the browser for selection. Otherwise the input will be processed in the search table of abbreviations of first letters of pronunciation notations of the native language. The query result of the URL or web-address will be sent to the browser for selection.

15

In accordance with the present invention, the intelligent search will comprise the determination whether a query matches precisely a website or webaddress or webpage. If it does not have a precisely matching website or webpage, a list of possible search results is provided to the user for selection.

20

Chinese character input is difficult for many users. However, if the computer of the browser is equipped with the Chinese input software, the Chinese characters may be entered as a search inquiry. This will initiate the intelligent search of Chinese characters. To provide users with more options, in certain
25 embodiments of the present invention, the system and method of intelligent information processing may accept "Pinyin" i.e., pronunciation notations or "Pinyin" headers, i.e., pronunciation alphabet abbreviations of desired query term so as to get a list of possible search results.

30 The system and method may also process telephone number input and get to a relevant website corresponding to the registered telephone number. If a person's name (either in Chinese or English) is entered, the person's web-card may be retrieved from a remote webcard server, such as the one provided by <http://www.letscard.com>, or any other similar servers. These aspects of the

invention are closed in other corresponding patent applications of the same applicant.

BRIEF DESCRIPTION OF THE DRAWINGS

5 The accompanying drawings illustrate the embodiments of the present invention and the present invention can be better understood through them following detailed description in connection with the accompanying drawings.

10 Figure 1 illustrates an example of a networked computer system that may be utilized to execute the software of an embodiment of the invention.

Figure 2 shows one embodiment of the invention.

Figure 3 shows a process of controlling a browser's URL input window.

Figure 4 shows a screen shot of a browser with Chinese Natural Language Access and Navigation Service.

15 Figures 5A, 5B, and 5C illustrate the three basic infrastructures of the intelligent information processing in a wide area network in accordance with the present invention.

Figure 6 shows a process for Chinese natural language processing.

Figure 7 shows another process for Chinese natural language processing.

20 Figure 8 shows the method of Chinese characters and/or English words processing of the present invention.

Figure 9 shows the method of full Chinese phonetic spelling words processing of the present invention.

25 Figure 10 shows the method of abbreviated Chinese phonetic spelling words processing of the present invention.

Figure 11 illustrates the process of determining types of words of a query entry before the information processing in accordance with the present invention.

30 Figures 12A and 12B illustrate, respectively, the search method of homonym words of full phonetic spelling and the search method of full phonetic spelling words with dialect misspellings in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As will be appreciated by anyone skilled in the art, the present invention may be embodied as a method, data processing system or program products.

Software written according to the present invention is to be stored in some form of computer readable medium, such as memory, or CD ROM, or transmitted over a network, and executed by a processor. Nonetheless, the principles of the present invention may be described in a method of intelligent information processing in a network or a system of intelligent information processing in a network as stated in details hereinafter.

Figure 1 shows a system of the present invention. A user machine/computer 101 is connected to web servers 102 and Internet resource locator servers such as the servers 103 and 104 at <http://www.3721.com> via Internet connections 108, 109. The user computer 101 may be any kinds of computers running Microsoft® Windows operating system, including PCs, Macintosh computers, an Internet appliance such as a WebTV and a wireless Internet browsing device. The user computer 101 may be connected to the Internet via a dial in modem, a DSL line, a cable modem, a dedicated line such as T1 or T3, or an optical fiber connection. A person skilled in the art would appreciate that this invention is not limited to specific type of user computer or connection between the user computer and the Internet. The Internet resource locator servers 103 and 104 include the browser pattern database 105, URL pattern 106, and other patterns 107.

Figure 2 shows a user computer 203 connected, via Internet connection 202, to an Internet resource locator server 201, such as 3721 server or other servers containing the server software of the present invention. An image of the screen of a browser is executing in the user's computer 203. Small user-end computer software of the invention is also executing in the user's computer 203 (see the small picture on the bottom of the screen). The small user-end computer software intercepts the text message (msg) input from the address box of the browser. The message is either transmitted to the Internet resource locator server 201 for processing or processed locally by the small user-end software.

Figure 3 shows the process performed by the user end software of the present invention. The user end software inject into all running processes use win 32

hook technology. A hook is a point in the Microsoft® Windows message-handling mechanisms where an application can install a subroutine or a separate module to monitor the message traffic in the system and process certain types of messages. A hook procedure can be global, monitoring
5 messages for all threads in the system, or it can be thread specific, monitoring messages for an individual thread. Some hooks may be set with system scope only (e.g. WH_SYMSGFILTER), but most hooks have either system or thread scope. Teachings on the user of Win32 hooks may be found, for example, at Microsoft® MSND web site ([http ://www.microsoft.com](http://www.microsoft.com)).

10

All running processes are checked to determine whether it is a target. If it is a target, information about the process is used to find the edit control of the browser where users input URL. The information may be user to search a browser pattern library to determine which version of the browser is executing
15 in the user's computer. The database may be automatically updated.

20

Once the edit control is found, a subclass is created. The message of the Edit Window may be combo box, drop down selection or keyboard input. If it is a keyboard input, it is checked to see whether it is a URL address. It is also
20 search against a database with regular URL pattern library. If it is combo box or drop-down selection, it is processed as shown in Figure 3.

25

Figure 4 shows an image of a browser (in Chinese version) interacting with the user end software of the present invention. A user enters the word "computer" in Chinese in the address box of the browser, a list of addresses in Chinese
25 related to this word is generated.

30

Nonetheless, nowadays, the web search of desired websites is not only carried out through English words, using either URL or keywords, but also carried out
30 in other native languages, such as Chinese. This will require some pertinent information processing method or system that may effectively and accurately carry out such web search using the native languages.

It can be appreciated that a search is normally carried out through a database

that contains particularly designed search tables to facilitate various search tasks. There is no exemption for web search in, for instance, Chinese languages. For purpose of carrying out the search of the present invention, at least the Internet resource locator server should contain at least a Chinese
5 character search index table, a full phonetic spelling (Pinyin) search index table, and phonetic spelling alphabet abbreviation (Pinyin header) of Chinese words search table.

Normally, when a query of keywords is entered, the entered phrases of the
10 keywords are broken down into several meaningful words that will be matched against the search table of predetermined structure. Then, the results of the words will be considered together to determine the final result or results of the query. However, for some native languages, such as Chinese, the entered query may be in Chinese characters. Each character may or may not have
15 any exact meaning, and a combination of one character with other characters may create various meaningful Chinese words. Hence, a simple breakdown of a query in Chinese may not assure an accurate result of the query. Thus, the present invention separates the entered phrase or characters of the query into meaningful Chinese words of all possible combinations of the entered Chinese
20 characters.

For instance, the first character is not just simply combined with the following second and/or third characters to get the meaningful word, and then the subsequent characters, after the previous combination, will form any other
25 meaningful words. In the present invention, the first character will be combined with anyone of the entered characters to form all possible meaningful words for the query. Therefore, the obtained query results may assure the accuracy of the query when all results come from all of these possible combined meaningful words.

30 The possible query inputs in Chinese based websites are Chinese character inputs, URL inputs, and Pinyin inputs that further include full phonetic spelling inputs, first letter abbreviations of phonetic spelling, homonym of phonetic spelling inputs, and local accent phonetic spelling inputs. Before going into the

details of the method and system of the present invention for each of the aforesaid inputs, a discussion of the current techniques of Chinese inputting may assist the better understanding of the present invention.

5 The major encoding systems for Chinese are: Big 5, and Guobiao (i.e., national standard). Generally, Big5 is preferred for processing traditional Chinese characters or Guobiao for the simplified characters. Under the Big 5 encoding system popular in Hong Kong and Taiwan, the coding for (tian, "sky") is 1101000110100100. The Guobiao encoding for "tian" is 1110110011001100.

10 Note that the Big 5 code or Guobiao code for "tian" above begins with a 1, while the ASCII code for letter "A" begins with a 0. This pattern holds generally true, that is, all Chinese codes begin with 1 and all ASCII codes begin with 0. In this manner, in a file that contains both English and Chinese text, the system can detect whether a given byte is intended as English or Chinese.

15

Entering (inputting) and processing Chinese language text on a computer is a very difficult problem. The sheer numbers of Chinese characters illustrate this difficulty. In the square-character (Hanzi) writing system of Chinese, there are 3000 to 6000 commonly used Chinese characters (Hanzi). Including the
20 relatively rare ones, there are more than ten thousands Chinese characters. Adding to this difficulty, there are problems in the Chinese language with text standardization, multiple homonyms, and ill-defined word boundaries that impede effective text processing of Hanzi with computers. In spite of intensive studies for several decades and the existence of hundreds of different methods,
25 computer input and processing of Chinese is a major stumbling block preventing the use computers in China, particularly for text processing.

At present, computer systems available for inputting and processing Chinese language text may be divided into three categories. The first category is based
30 on a decomposition of the Chinese characters into elementary graphical components. The decomposition of Chinese characters of each method is not unique. Therefore, it is rather difficult for people to learn those methods.

The second and third categories are based on pronunciation, such as full

phonetic spelling method. These methods encounter a "homonym problem" in Chinese language processing. The second category is phonetic input, (e.g. "Pinyin" for mainland China and "phonetic symbols" or BPMF for Taiwan) which is the most commonly used method for everyone except professional typists.

5 The Chinese character writing system of Chinese language is a conceptual and practical barrier to this method.

Although there are only about 1300 different phonetic syllables, in contrast to tens of thousands of characters, one phonetic syllable may correspond to
10 many different Chinese characters. For example, the pronunciation of "yi" in Mandarin can correspond to over 100 Chinese characters. This creates ambiguities when translating the phonetic syllables, as the inputs, into the corresponding Chinese characters.

15 To address this "homonym problem," most of the phonetic input systems use a multiple-choice method. See for example, German patent 3,142,138, issued May 5, 1983 to J. Heinzl et al.; U.S. Patent No. 5,047,932, issued September 10, 1991 to K. C. Hsieh; and Chinese Patent Publication No. 1064957, issued March 8, 1991 to Tan Shanguang. After a phonetic syllable is keyed in, the
20 computer displays all possible characters with the same pronunciation. In some cases, there is not enough space on the screen to display all possible characters with the same pronunciation. This will require scrolling up and down. Therefore, these phonetic methods, based on individual syllables, are very slow.

25 An improvement to the multiple-choice methods based on deriving probability of the adjacent Chinese characters is disclosed in, for example, British Patent 2,248,328, issued on April 1, 1992 to R. W. Sproat. The probability approach can further be combined with grammatical constraints. See for example, K. T.
30 Lua et al., Computer Processing of Chinese and Oriental Languages, Vol. 6, Num 1, page 85, June 1992. However, the conversion accuracy (phonetic to characters) of these methods is typically limited to around 80%.

The third category combines a phonetic-character input method with the

addition of non-phonetic letters. Non-phonetic letters are added to the phonetic letters to artificially discriminate characters with the same pronunciation. Examples include phonetic spelling with radical marks (British Patent No. 2,158,776, issued Nov. 20, 1985 to C. C. Chen) and phonetic spelling with
5 number of strokes (Chinese Patent Publication No. 1066518, issued November 25, 1992 to G. Xie). These methods require memorizing artificial rules or counting number of strokes that slows down the speed of input substantially.

Other methods for inputting Chinese characters are described in, for example,
10 U.S. Patent No. 6,073,146. The '146 patent teaches a system employing a keyboard with diacritic keys (and corresponding ASCII coding) that permit the user to annotate each entered phonetic text syllable with a diacritic that indicates the tone of the syllable. A process executing on the system determines that a syllable has been entered when a diacritic (or delimiter) key
15 is struck. All entered phonetic syllable is then compared to a list of acceptable phonetic syllables and abbreviations. If the entered syllable is on the list, the correctly spelled and accented syllable is stored in memory and displayed on a phonetic portion of a graphical display. The process continues for succeeding syllables until a delimiter is entered. Upon encountering a delimiter, the word
20 string (defined as the string of characters between two delimiters) is analyzed using morphological and syntactical processes and/or a statistical language model to unambiguously determine the proper Chinese characters that represent the word(s) in the word string. The unique Chinese translation is stored in memory and displayed on a Chinese character portion of the
25 graphical interface.

In accordance with the present invention, the query index data structure for Internet keyword search are illustrated in Figure 5A, 5B, and 5C. These are the approximate infrastructure of three search index tables of the present invention.
30 In order to realize the high speed intelligent search of Internet keyword, it is very important to establish a high efficient data infrastructure that is suitable for searching massive data. The three data structures of the present invention are (1) the index table for intelligent search for identifying words or phrases of normal Chinese characters and English word; (2) the index table for intelligent

search based on full phonetic spelling of Chinese characters; (3) the index table for intelligent search based on phonetic spelling alphabetic abbreviation.

5 With respect to Figure 5A, the index table is a Chinese or English Word List that contains all Chinese or English words, for instance, "China", "software", "computer", "ibm" etc. In the Chinese or English Word List, each word is connected to an Internet Keyword Point List. In such a table, each point indicates a pointer pointing toward an actual storage space of an Internet Keyword, in which such a word is contained. Therefore, it may search for all
10 Internet keywords that contain the word, either in Chinese or English, from the Internet Keyword Entry Point List linked to each of said words.

With respect to Figure 5B, the data structure is similar to the one in Figure 5A. Only the left side Chinese words are in the form of Pinyin, i.e., phonetic
15 spellings. For instance, the above given words in Chinese are now "zhongguo", "ruanjian", "diannao", etc. The linked Internet Keyword Entry Point List is a list of the Internet Keywords that contain such a word in Chinese phonetic spelling form.

20 Figure 5C also has similar data structure as the one in Figure 5A. The difference is that on the left side of the word table each of such words is in the form of phonetic spelling alphabetic abbreviations, such as, "zg", "rj", "dn" etc. Thus, the related Internet Keyword Entry Point List includes words corresponding to these phonetic spelling alphabetic abbreviations for the query.
25 From these three figures, it can be seen that the three basic intelligent search methods have similar data structure, but have the words stored in different forms of Chinese or English words, full phonetic spelling (Pinyin), or phonetic spelling alphabetic abbreviations (headers of phonetic spelling words). Therefore, it can be understood that the internal computing method for these
30 three kinds of search is the same. The key is how these words being grouped or selected from the query to form meaningful search words. As discussed above, the query is broken up into several combinations of characters indicative of all possible meaningful words as thus combined to assure every possible search words pointing to the Internet Keywords on the list, and how

the query is identified as Chinese character entry or English word entry, full phonetic spelling word entry or phonetic spelling alphabetic abbreviation entry. The corresponding methods according to the present invention are discussed hereinafter.

5

Despite of the development of easier methods, inputting Chinese characters is still an extremely difficult task. Particularly if the internet device is a handheld device such as a Personal Data Assistant or a cell phone with wireless internet connection. In one aspect of the invention, methods for simplifying the entry of Chinese characters are provided. The methods are particularly useful for entering web addresses or natural language keywords or names of a web site (page). Figure 6 shows one embodiment of the invention. In this method, the user types in the first letter of the Pinyin spelling of a Chinese word indicated at 501. The first letter is used to query a database and a list of possible URLs are listed indicated at 502. The list may be based upon statistical information such as frequency of requests. In other words, the most popular URLs are listed first indicated at 503.

In another embodiment of the invention as seen in Figure 7, the Pinyin spelling of a Chinese word is inputted at 601. The spelling is checked to determine whether it contains frequent misspellings at 602. Misspelling frequently occurs because of accent. In the southern part of China, because of southern accent, many southerners make phonetic spelling mistakes of Chinese characters. If the phonetic misspelling occurs due to the southern accent, the system of the present invention will correct them automatically at 605. If the query does not have any phonetic misspelling or the misspelling has been correct, it will then check a database of related URLs at 603. The output will be displayed at 604.

The small user-end software that is supported through a back-end intelligent search engine and database exemplifies one embodiment of the invention. The software may be downloaded from <http://www.3721.com>. Users do not need to know or type the long and complicated alphabetical URLs, instead they simply type Chinese characters, in the web address box, for familiar brands, product names, and they will be brought to their desired destination sites or related

webpages. For example, instead of typing <http://www.legend.com.cn>, users can simply type "Legend Computers" in Chinese and will get to the site they wish to visit.

- 5 Turning now to the key features of the present invention, Figure 8 shows the basic flow chart of the Chinese character and/or English words search of the present invention. After the query string A in the form of Chinese characters and/or English words is entered at 801, the system will parse the query string A against the Chinese English Words List (CEWL), and split the query string A to
- 10 one or more Chinese words: $W=\{W_1, W_2, \dots, W_N\}$ at 802. For each word W_x in W, at 803 the system parses the word W_x in the CEWL to find the attached Internet Keyword Entry Point List (IKEPL_x), and then each node in the IKEPL_x will point to an Internet Keyword (IK) containing the word W_x .
- 15 The system will combine all IKEPL₁, IKEPL₂ ... IKEPL_N and get the result R at 804, that is, $R = \text{IKEPL}_1 \cup \text{IKEPL}_2 \cup \dots \text{IKEPL}_N$. Since each IKEPL_x points to an IK containing a word W_x , an IK in R will then contain at least one word W_x in W. At 805, while doing the combination, the system will calculate the weight of each IK in R according to specified rules, such as the followings:
- 20 (1) Weight of count: the number of words within W that the IK contains.
(2) Weight of length: the total length of words within W that the IK contains...
- Finally, the system will calculate the comprehensive weight of each IK based on the above rules. After the calculation, at 806 the system will sort the result list R according to weight of IK, such that the most approximate result appears
- 25 at head of the list, and the system will limit the number of result in R. Then, the final IK list R appears at 807.

Likewise, as seen in Figure 9, the entered query string A is in the form of full phonetic spelling at 901. After the entry of the string A, the system parses the

30 string A against Full Chinese Pinyin Words List (FCPWL) and splits it into one or more Chinese phonetic spelling words: $W=\{W_1, W_2, \dots, W_N\}$ at 902. For each word W_x in W, at 903 the system will parse it in the FCPWL to find the attached Internet Keyword Entry Point List IKEPL_x, and then each node in

IKEPL_x will point to an Internet Keyword (IK) whose phonetic spelling containing Wb_x. Then, at 904, the system combines IKEPL₁, IKEPL₂, ..., IKEPL_N to obtain a result $R = \text{IKEPL}_1 \cup \text{IKEPL}_2 \cup \dots \text{IKEPL}_N$. Thus, each IK in R has a phonetic spelling containing at least one word W_x in W. The following steps 906-907 are very much the same as those of 805-807, that is, calculating the weight of each IK in R according to specified rules; sorting the result list R according to weight of IK, so as the most approximate result appears at head of the list, and limit the number of result in R; and the finally obtaining a result IK list R.

For the same token, as seen in Figure 10, a user will input a query string A in an abbreviated Chinese phonetic spelling string A at 11. The system parses the string A against ACPWL, and splits the string A into one or more abbreviated Chinese phonetic spelling words: $W = \{W_1, W_2, \dots, W_N\}$ at 12. Then at 13, for each word W_x in W, the system parses the word in ACPWL to find the attached Internet Keyword Entry Point List IKEPL_x, and then each node in IKEPL_x will point to an Internet Keyword (IK) whose abbreviate phonetic spelling containing the word W_x. Then at 14, the system combines IKEPL₁, IKEPL₂, ..., IKEPL_N to get a result $R = \text{IKEPL}_1 \cup \text{IKEPL}_2 \dots \text{IKEPL}_N$ and then each IK in R has an abbreviated phonetic spelling containing at least one word W_x in W. The following steps 15-17 are substantially the same as those in Figures 8 and 9, that is, calculating the weight of each IK in R according to specified rules; sorting the result list R according to weight of IK, such that the most approximate result appears at head of the list, and limiting the number of result in R, and obtaining the final result IK list R.

On the basis of the above three kinds of intelligent search modes, i.e., for Chinese characters and/or English words, full Chinese phonetic spelling words, and abbreviated Chinese phonetic spelling words, the method and system of intelligent information processing in a wide area network, according to the present invention, will determine whether the query entry is a string of Chinese characters and/or English words, full Chinese phonetic spelling words, and abbreviated Chinese phonetic spelling words as shown in Figure 11. That is,

after the entry of a string A at 110, the system will determine whether the entered query string is in the form of full Chinese phonetic spelling words at 111. If it is, the system will carry out the calculation in accordance with the intelligent search method of full phonetic spelling words search as shown in Figure 9.

If it is not a string of full Chinese phonetic spelling words, the system will determine whether the query string is in the form of abbreviated Chinese phonetic spelling words at 112. If it is, the system will carry out the calculation of abbreviated Chinese phonetic spelling words as shown in Figure 10. If it is not, the system thus determines that the query string is in the form of Chinese characters and/or English words, and will carry out the calculation of the same as shown in Figure 8. However, in one situation, the system will determine whether the calculation result of either the full Chinese phonetic spelling word search or the abbreviated Chinese phonetic spelling words search is empty at 113. If it is empty, the system will do the calculation of Chinese characters and/or English words search as seen in Figure 8 again. If the calculation of the search mode of Figure 9 or Figure 10 is not empty, the calculation result thereof will then be determined as the final result.

20

Figure 12A illustrates a search method of homonym words of full phonetic spelling in accordance with the present invention. After the query string is entered at 121, the system will analyze all possibility of the homonym words, and generate all of these words as searchable words of full Chinese phonetic spelling at 122. For each of the homonym words of full Chinese phonetic spelling, the system will carry out, at 123, the calculation of full Chinese phonetic spelling words search as discussed with respect to Figure 9. After obtaining all search results R_N , the system will analyze the results R_N and obtain the final and most possible result or limited number of results at 124.

30

Figure 12B illustrates a search method of full phonetic spelling words with dialect misspellings in accordance with the present invention. Furthering the method and system of Figure 7, after the entry of a query string of phonetic spelling words at 125, the system of the present invention will analyze, at 126,

- the entered words against a table listing all possible misspelled consonants or vowels for corresponding Chinese characters by southerners, such as "huang" and "wang", "shi" and "si", "lu" and "lù", etc. Anyway the possible misspelling words are enumerated on the list. Thus, the entered query string is separated
- 5 into several words of phonetic spelling to cover all possible spelling words, and then they are calculated through the method of full phonetic spelling search to obtain all possible IK of the result at 127. Then, the search results are analyzed to obtain the final and most possible result or results at 128.
- 10 It can be understood that the above description is intended to be illustrative and not restrictive. Many variations of the invention will be apparent to those skilled in the art upon reviewing the above description. The scope of the invention should, therefore, be determined not only with reference to the above description, but also with variations and equivalent. While the invention will be
- 15 described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention.

CLAIMS

1. A method of intelligent information processing in the Internet comprising:

- 5 a) identifying whether an input is one of a URL address, English words, native language characters, and native language pronunciation notations;
- b) if the input is a regular URL, querying the input in a corresponding server through the Internet, and directly obtaining the query result therefrom;
- 10 c) if the input includes the native language pronunciation notations, parsing the input against at least one phonetic spelling word list to find out corresponding Internet keyword, and then fetching a corresponding query result; and
- d) if the input includes characters of a native language, processing the input as a natural language input in a natural language table, and
15 obtaining a desired Internet keyword, and fetching a corresponding query result of website URL.

20 2. The method of claim 1, further comprising determination of whether the pronunciation notations are either full phonetic spelling words or abbreviations of first letters of phonetic spelling words, and if the input is a string of full phonetic spelling words, the input string is parsed in a full Chinese phonetic spelling word list with all possible combinations of meaningful words.

25

30 3. The method of claim 1, wherein after the entry of the query string in full phonetic spelling, the system parses the query string against a Full Chinese Pinyin Words List (FCPWL) and splits the query string into one or more Chinese phonetic spelling words, that is $W=\{W_1, W_2, \dots W_N\}$; and for each word W_x in W , the system will parse query input in the FCPWL to find the attached Internet Keyword Entry Point List $IKEPL_x$, such that each node in $IKEPL_x$ will point to an Internet Keyword whose phonetic spelling containing W_x ; and then the system combines $IKEPL_1, IKEPL_2, \dots, IKEPL_N$ to obtain a

result $R = \text{IKEPL}_1 \cup \text{IKEPL}_2 \cup \dots \text{IKEPL}_N$; each Internet keyword in R having a phonetic spelling word containing at least one word W_x in W .

4. The method of claim 3, wherein after combination of the attached Internet keywords, the system further calculates the weight of each Internet keywords in R according to the specified rules, including weighing the count of the number of words within W that the Internet keyword contains, and weighing the total length of words within W that the Internet keyword contains; and then sorting the result list R according to weight of Internet keywords, so that the most approximate result appears at the head of the list, followed by limited number of results in R to obtain a final result Internet keywords list R .

5. The method of claim 1, further comprising determination of whether the pronunciation notations are either full phonetic spelling words or abbreviations of first letters of phonetic spelling words, and if the input is a string of abbreviations of first letters of phonetic spelling words, the input string is parsed in an abbreviation Chinese phonetic spelling word list with all possible combinations of meaningful words.

6. The method of claim 5, wherein after the determination of the query input being in an abbreviated Chinese phonetic spelling words, the system parses the query input against ACPWL, and splits the query input into one or more abbreviated Chinese phonetic spelling words, that is, $W = \{W_1, W_2, \dots, W_N\}$; and for each word W_x in W , the system parses the word in an abbreviated Chinese phonetic spelling word list (ACPWL) to find the attached Internet Keyword Entry Point List IKEPL_x , such that each node in IKEPL_x will point to a Internet Keyword whose abbreviated phonetic spelling words containing the word W_x , and then the system combines $\text{IKEPL}_1, \text{IKEPL}_2, \dots, \text{IKEPL}_N$ to get a result $R = \text{IKEPL}_1 \cup \text{IKEPL}_2 \dots \text{IKEPL}_N$; and then each Internet keyword in R has an abbreviated phonetic spelling word containing at least one word W_x in W .

7. The method of claim 6, wherein after combination of the attached Internet keywords, the system further calculates the weight of each Internet keyword in R according to the specified rules, including weighing the count of the number of words within W that the Internet keyword contains, and weighing the total length of words within W that the Internet keyword contains; and then sorting the result list R according to weight of Internet keywords, so that the most approximate result appears at the head of the list, followed by limited number of results in R to obtain a final result Internet keywords list R.
8. The method of claim 1, wherein said natural language table is a Chinese English Word List such that the input is parsed therein with all possible combinations of meaningful words to find out attached Internet keyword.
9. The method of claim 8, wherein after parsing the query input against the Chinese English Words List (CEWL), splitting the query input into one or more Chinese words $W=\{W_1, W_2, \dots, W_N\}$; for each word W_x in W, parsing the word W_x in the CEWL to find the attached Internet Keyword Entry Point List $IKEPL_x$, and then having each node in the $IKEPL_x$ point toward an Internet Keyword containing the word W_x .
10. The method of claim 9, wherein the system combines all $IKEPL_1, IKEPL_2 \dots IKEPL_N$ and gets a result R, that is, $R = IKEPL_1 \cup IKEPL_2 \cup \dots IKEPL_N$; and thus having each $IKEPL_x$ point to an Internet keyword containing at least one word W_x ; combining the obtained results, and calculating the weight of each Internet keyword in R according to specified rules, including:
- (1) Weighing the count of the number of words within W that the Internet keyword contains;
 - (2) Weighing the total length of words within W that the Internet keyword contains.
11. The method of claim 10, wherein the system will calculate the comprehensive weight of each Internet keyword based on the above rules,

and after the calculation, the system will sort the result list R according to weight of the Internet keywords such that the most approximate result appears at the head of the result list, and the system will limit the number of results in R to obtain the final Internet keyword list.

5

12.A method of intelligent information processing for homonym words of phonetic spelling comprising the steps of, after the entry of a query string of phonetic spelling words, analyzing all possible homonym words and identifying all of these words as searchable words of full Chinese phonetic spelling; for each of the homonym words of Chinese phonetic spelling, carrying out the calculation of full Chinese phonetic spelling words search in a full Chinese phonetic spelling words list; combining all search results therefrom, analyzing the results and obtaining the final and most possible results.

10

15

13.The method of claim 12, wherein said calculation of full Chinese phonetic spelling is carried out by parsing the query string against a Full Chinese Pinyin Words List (FCPWL) and splitting the query string into one or more Chinese phonetic spelling words, that is $W=\{W_1, W_2, \dots W_N\}$; and for each word W_x in W , the system will parse query input in the FCPWL to find the attached Internet Keyword Entry Point List $IKEPL_x$, such that each node in $IKEPL_x$ will point to an Internet Keyword whose phonetic spelling containing W_x ; and then the system combines $IKEPL_1, IKEPL_2, \dots, IKEPL_N$ to obtain a result $R = IKEPL_1 \cup IKEPL_2 \cup \dots IKEPL_N$; each Internet keyword in R having a phonetic spelling word containing at least one word W_x in W .

20

25

14.The method of claim 13, wherein after combination of the attached Internet keywords, the system further calculates the weight of each Internet keywords in R according to the specified rules, including weighing the count of the number of words within W that the Internet keyword contains, and weighing the total length of words within W that the Internet keyword contains; and then sorting the result list R according to weight of Internet keywords, so that the most approximate result appears at the head of the

30

list, followed by limited number of results in R to obtain a final result Internet keywords list R.

5 15.A method of intelligent information processing for full phonetic spelling words with southern accent misspellings comprising the steps of, after the entry of a query string of phonetic spelling words, analyzing the entered words against a table listing all possible misspelled consonants and vowels for corresponding Chinese characters by southerners; enumerating the misspelling words on the list; separating the query string into several words
10 of phonetic spelling to cover all possible spelling words; carrying out the calculation of full phonetic spelling words search to obtain all possible Internet words of possible search results; analyzing the search results to obtain the final and most possible results.

15 16.The method of claim 15, wherein after the determination of the query in correct full phonetic spelling words, the system parses the query string against a Full Chinese Pinyin Words List (FCPWL) and splits the query string into one or more Chinese phonetic spelling words, that is $W=\{W_1, W_2, \dots, W_N\}$; and for each word W_x in W , the system will parse query input in the FCPWL to find the attached Internet Keyword Entry Point List $IKEPL_x$,
20 such that each node in $IKEPL_x$ will point to an Internet Keyword whose phonetic spelling containing W_x ; and then the system combines $IKEPL_1, IKEPL_2, \dots, IKEPL_N$ to obtain a result $R = IKEPL_1 \cup IKEPL_2 \cup \dots \cup IKEPL_N$; each Internet keyword in R having a phonetic spelling word containing at
25 least one word W_x in W .

30 17.The method of claim 16, wherein after combination of the attached Internet keywords, the system further calculates the weight of each Internet keywords in R according to the specified rules, including weighing the count of the number of words within W that the Internet keyword contains, and weighing the total length of words within W that the Internet keyword contains; and then sorting the result list R according to weight of Internet keywords, so that the most approximate result appears at the head of the

list, followed by limited number of results in R to obtain a final result Internet keywords list R.

18. A system of intelligent information processing in the Internet comprising:

- 5 means for inputting a query string of words;
- means for identifying whether an input of words is one of a URL address, English words, native language characters, and native language pronunciation notations;
- 10 means for querying the input in a corresponding server through the Internet, and directly obtaining the query result therefrom if the input is a regular URL;
- means for parsing the input against at least one phonetic spelling word list to find out corresponding Internet keyword, and then fetching a corresponding query result if the input includes the native language pronunciation notations; and
- 15 means for processing the input as a natural language input in a natural language table, and obtaining a desired Internet keyword, and fetching a corresponding query result of website URL if the input includes characters of a native language.

20

19. The system of claim 18, further comprising means for checking whether the Chinese phonetic spelling words of the query input contain frequent misspellings due to the southern accent, and means for correcting the misspelled words automatically, and wherein after the determination of the query as correct phonetic spellings and correction of any misspelled words,

25 means for querying the database carries out the search of related URLs.

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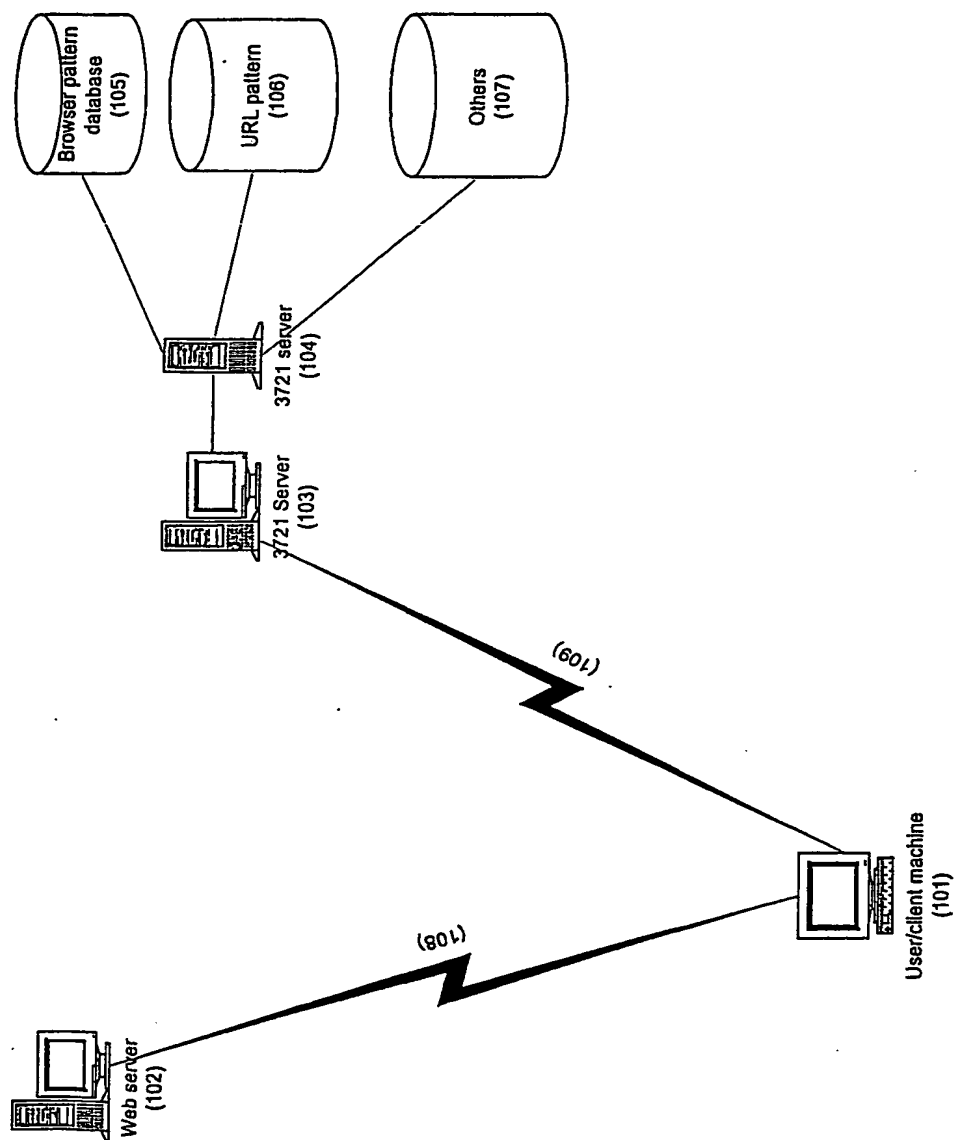


FIG. 1

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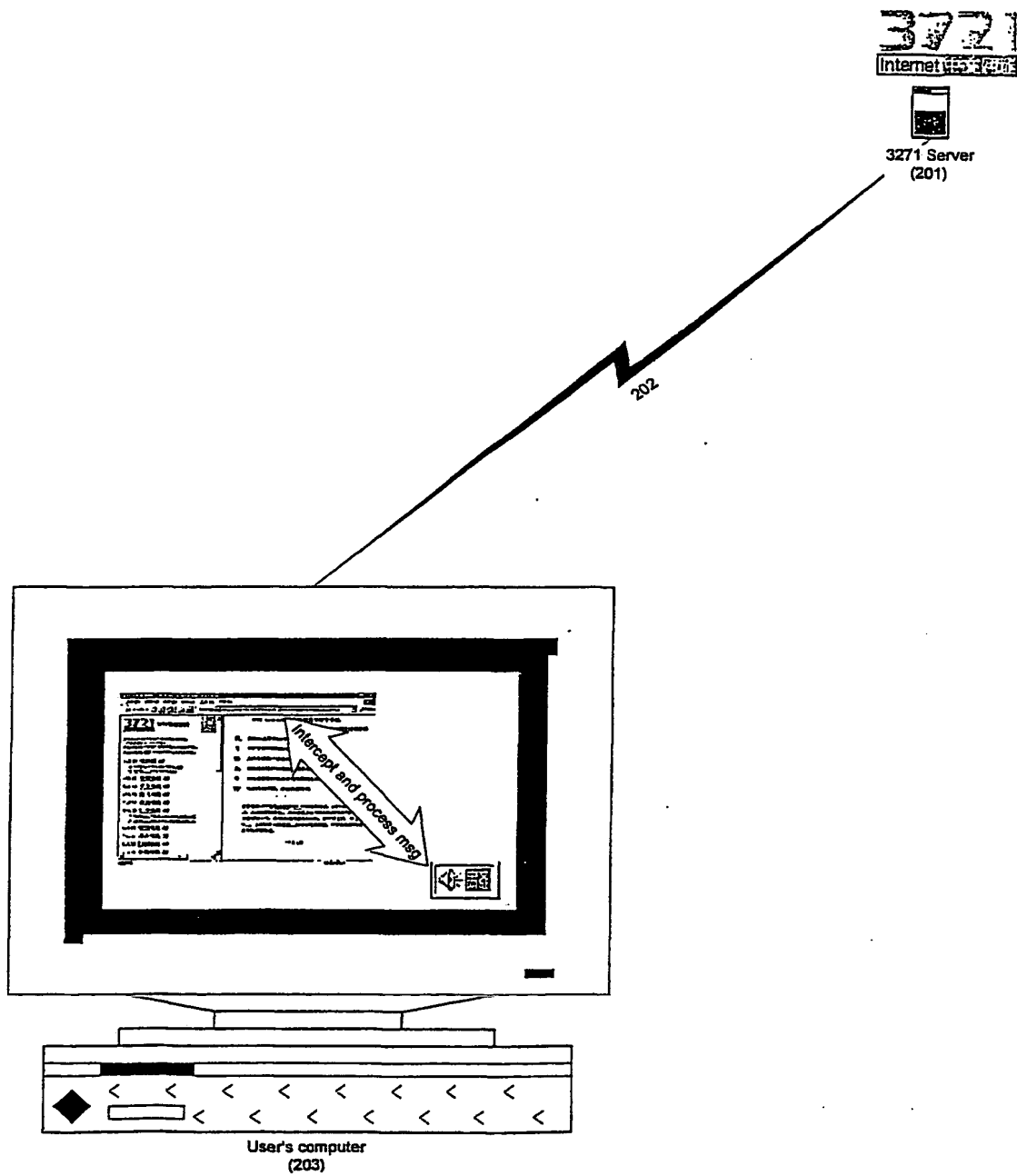


FIG. 2

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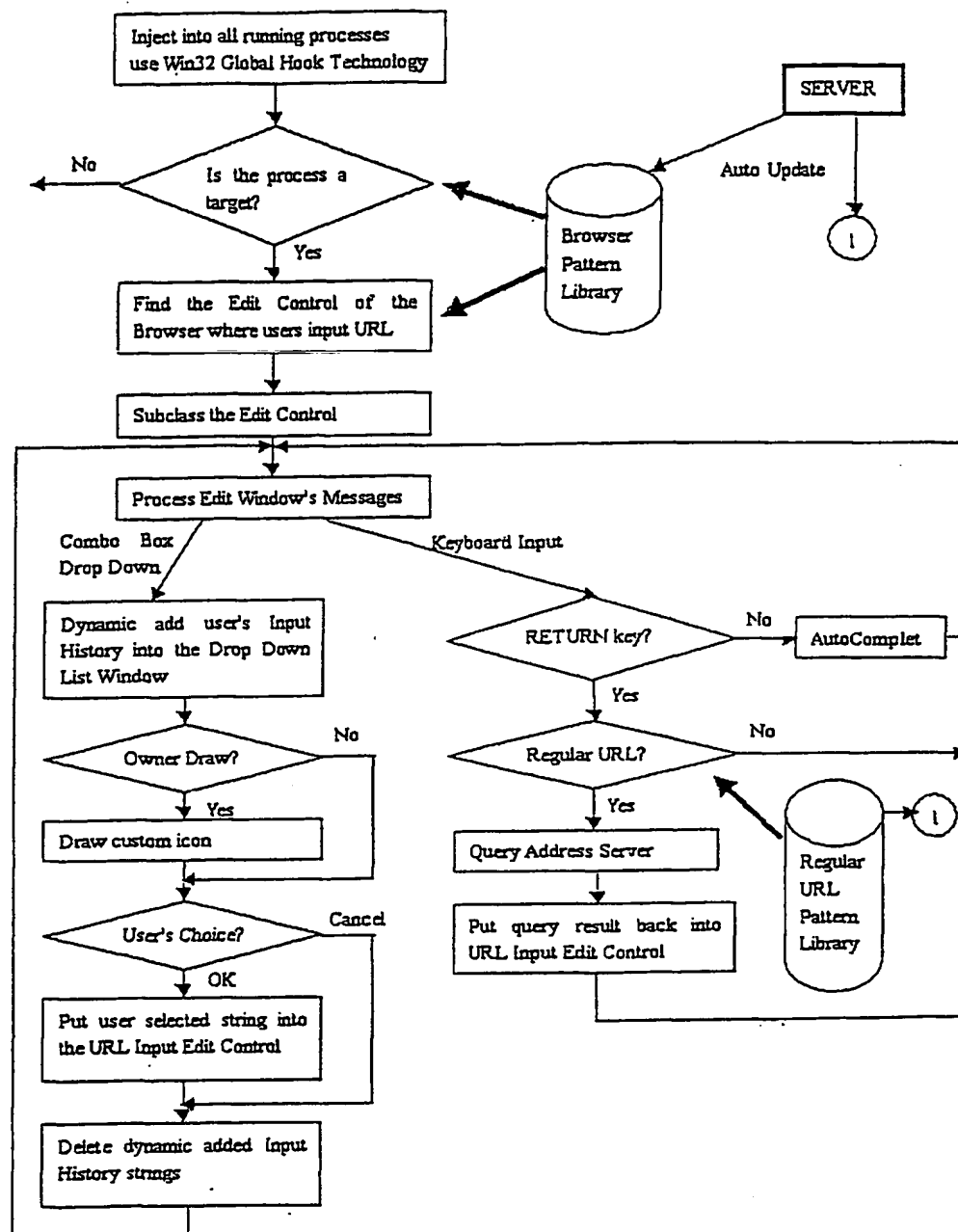


FIG. 3

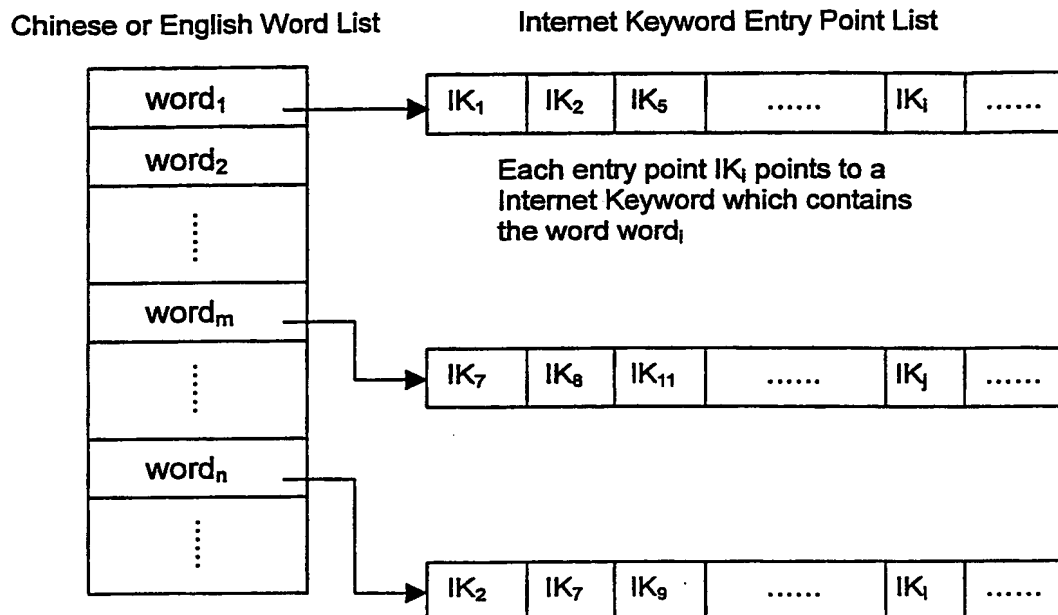


FIG. 5A

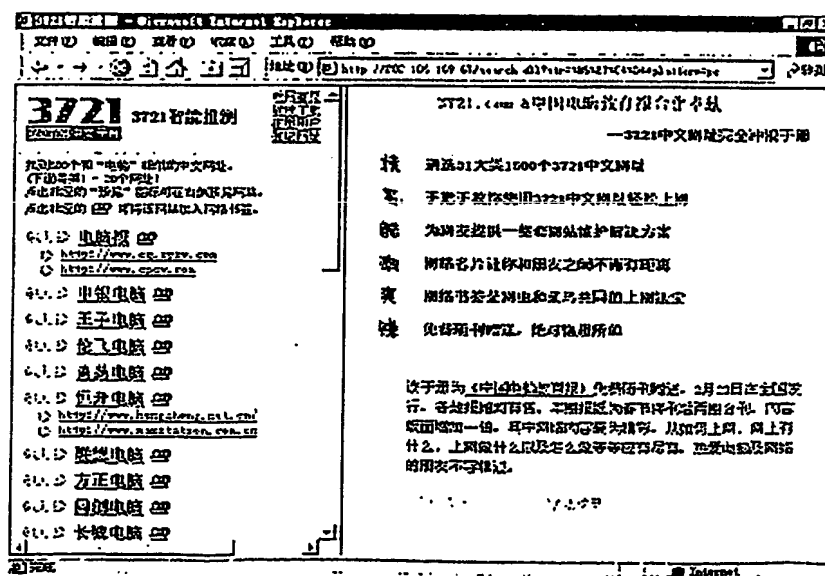


FIG. 4

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Full Chinese Phonetic Word List

Internet Keyword Entry Point List

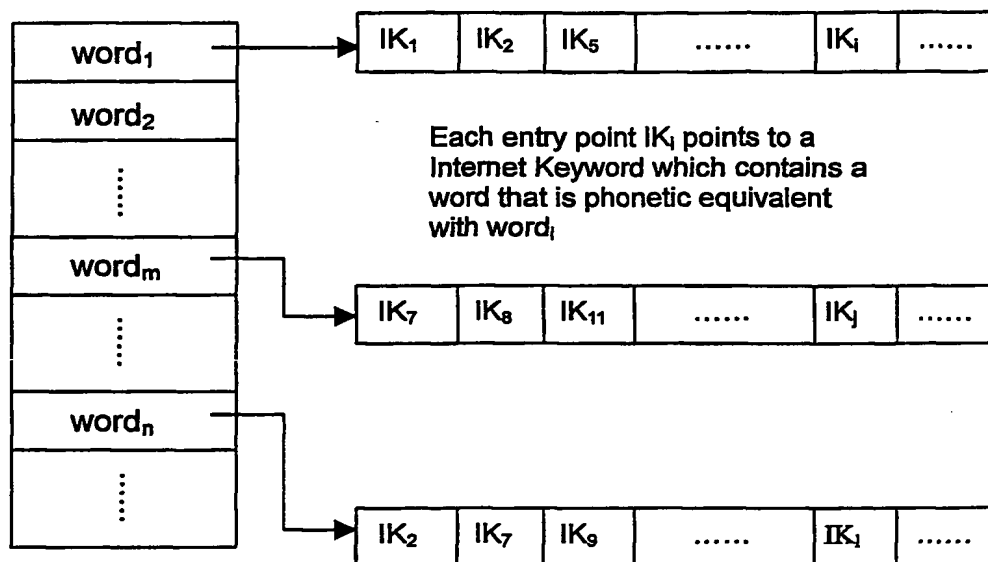


FIG. 5B

Abbreviated Chinese Phonetic Word List

Internet Keyword Entry Point List

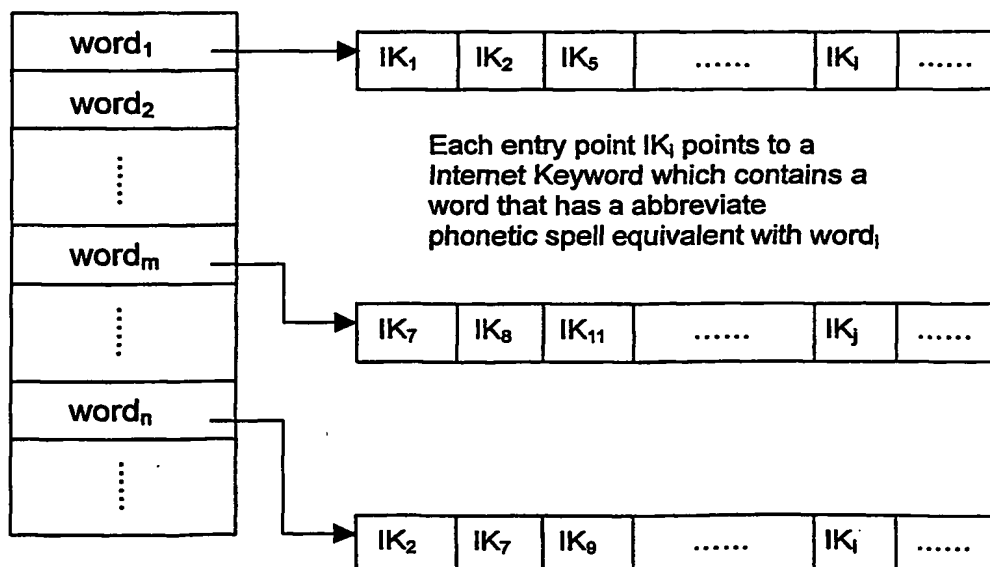


FIG. 5C

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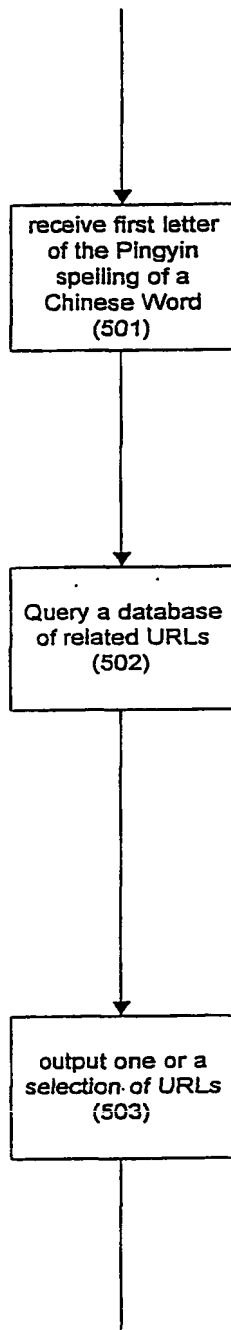


FIG. 6

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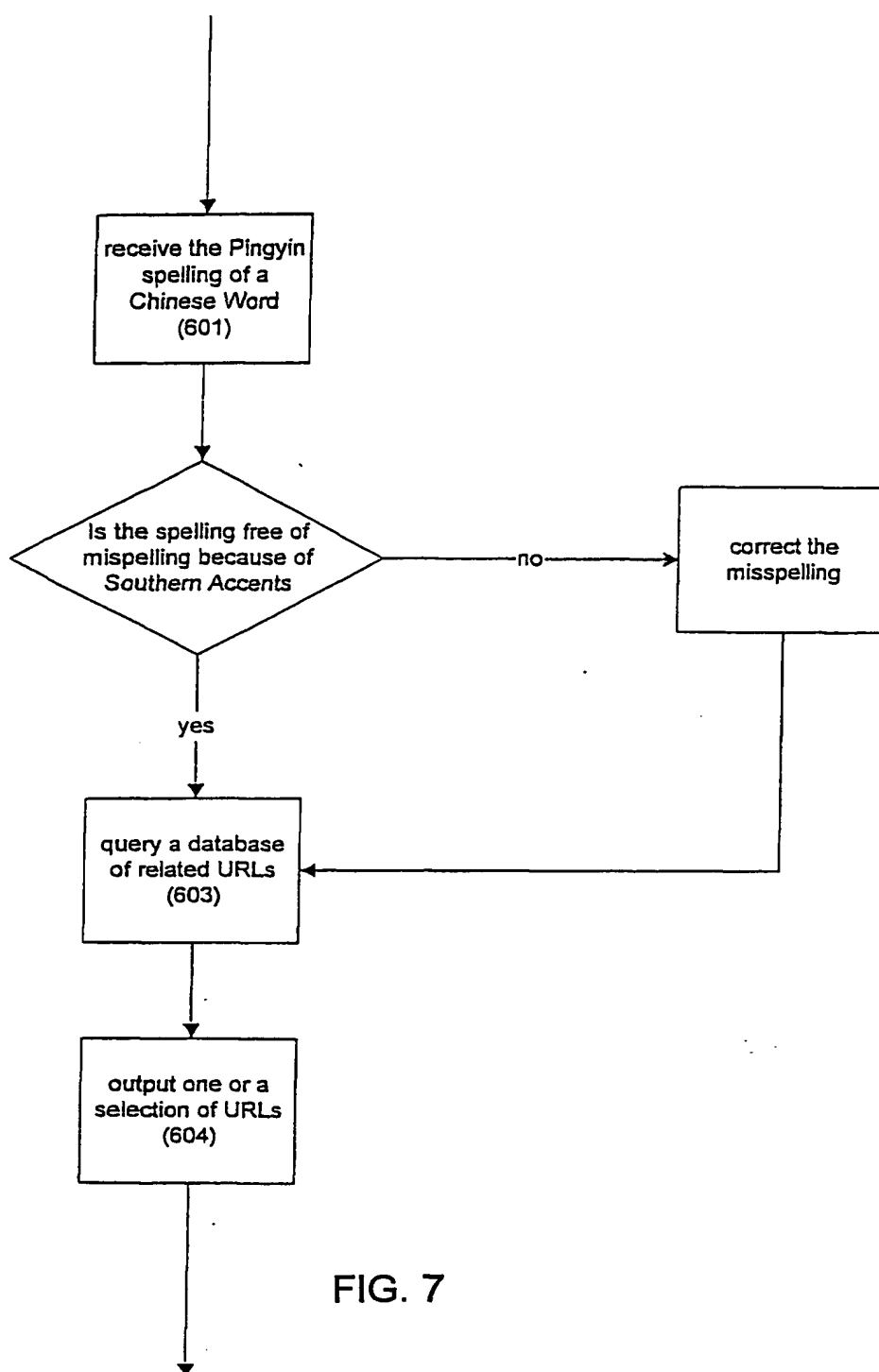


FIG. 7

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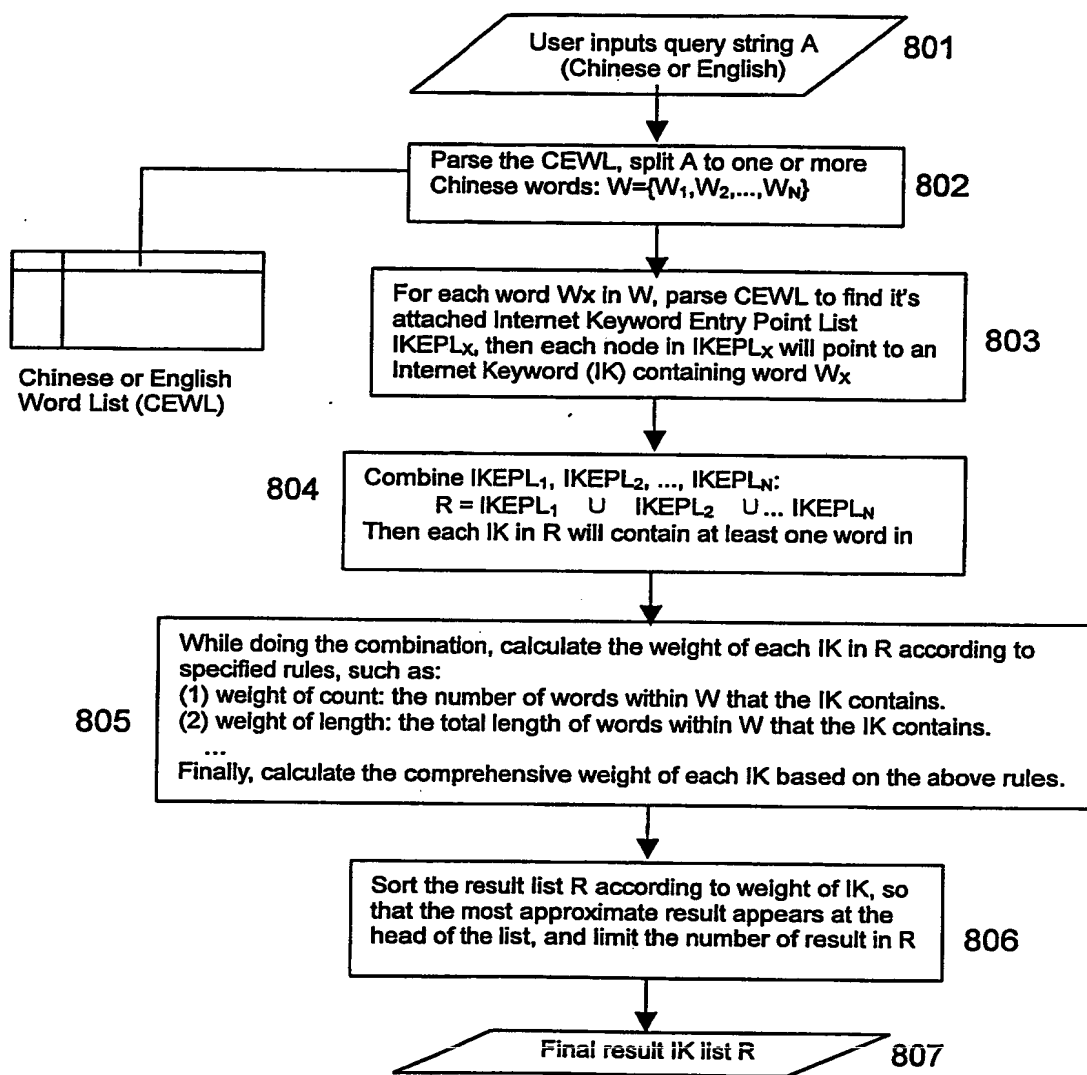


FIG. 8

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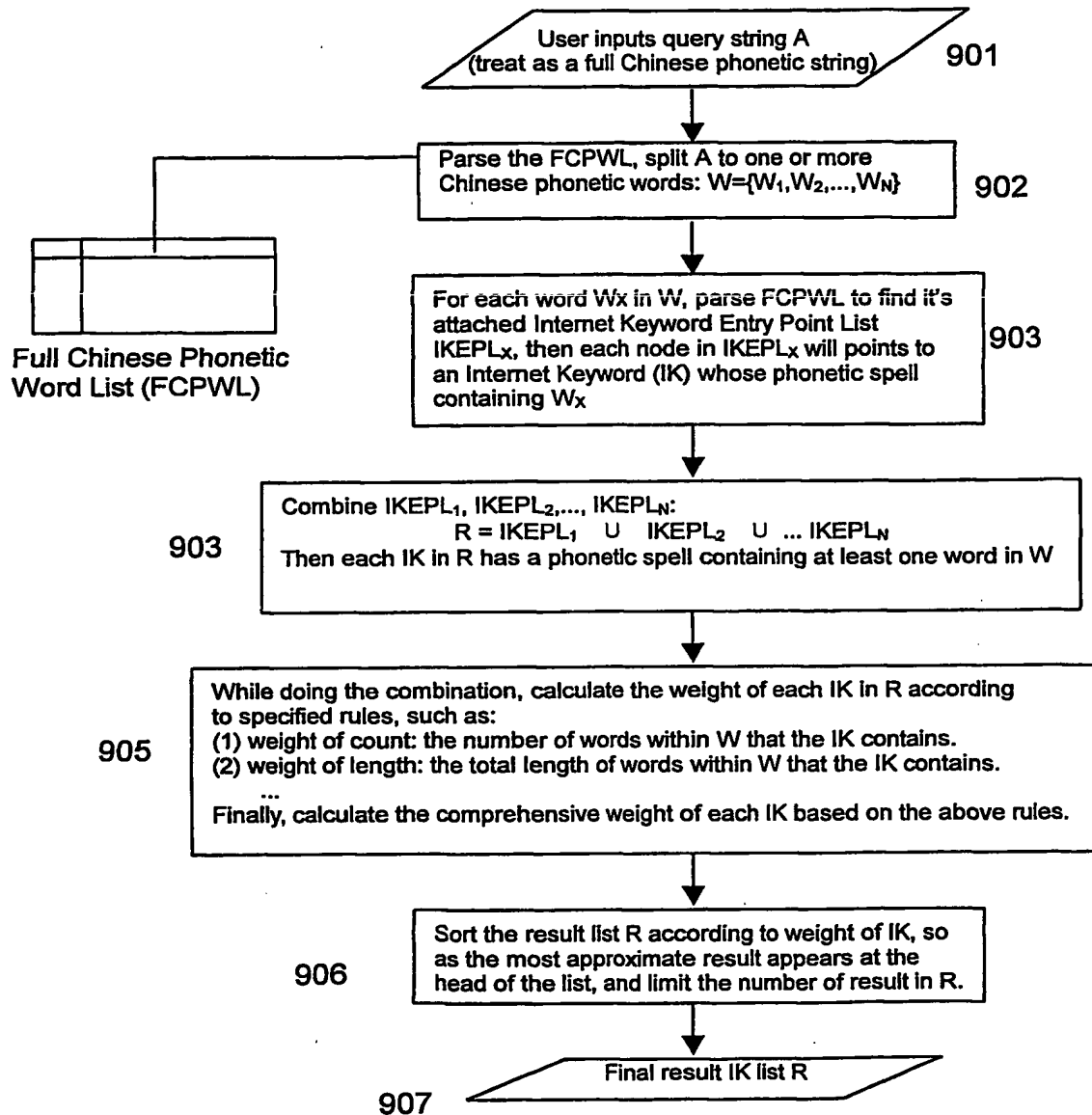


FIG. 9

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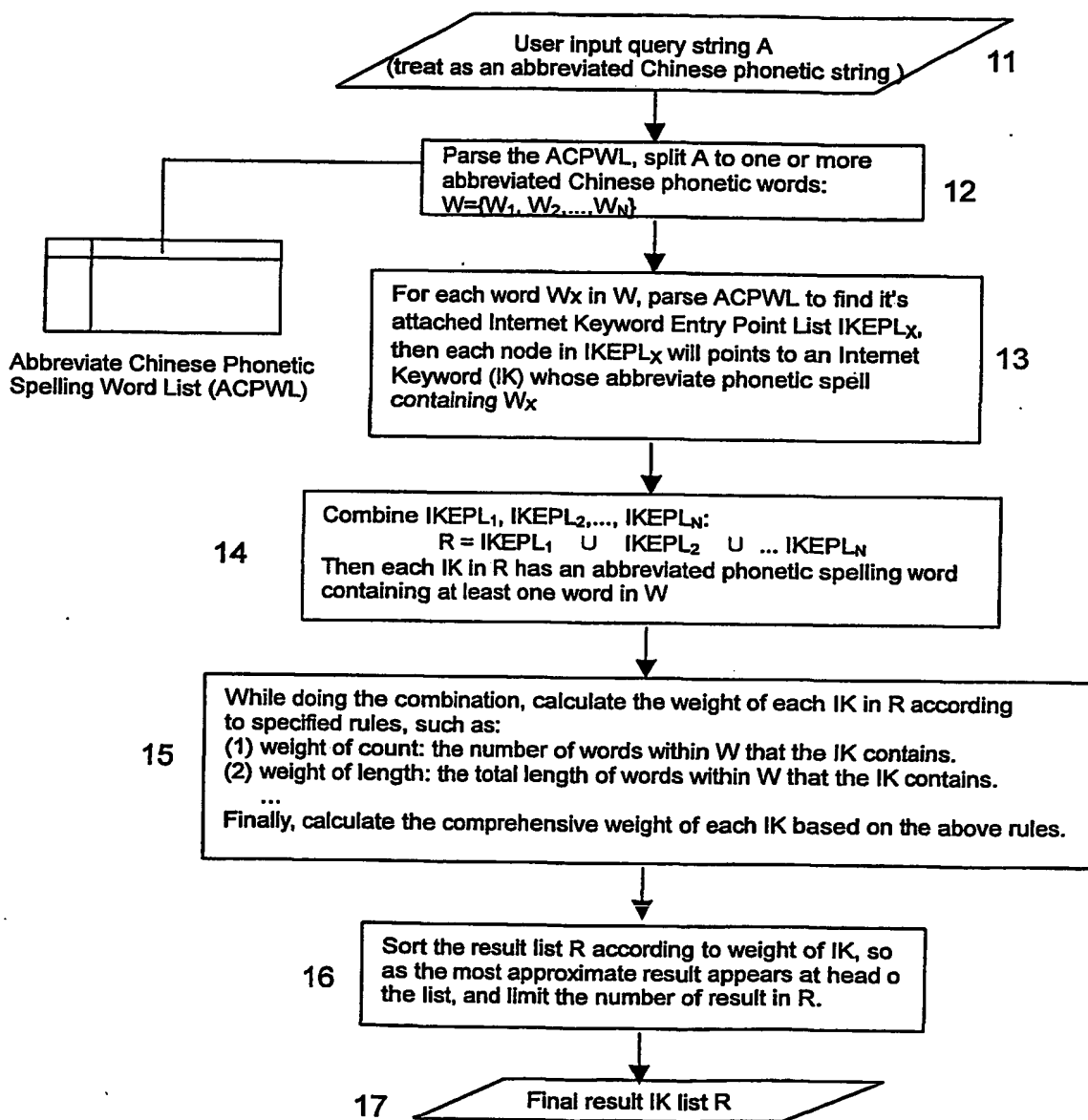


FIG. 10

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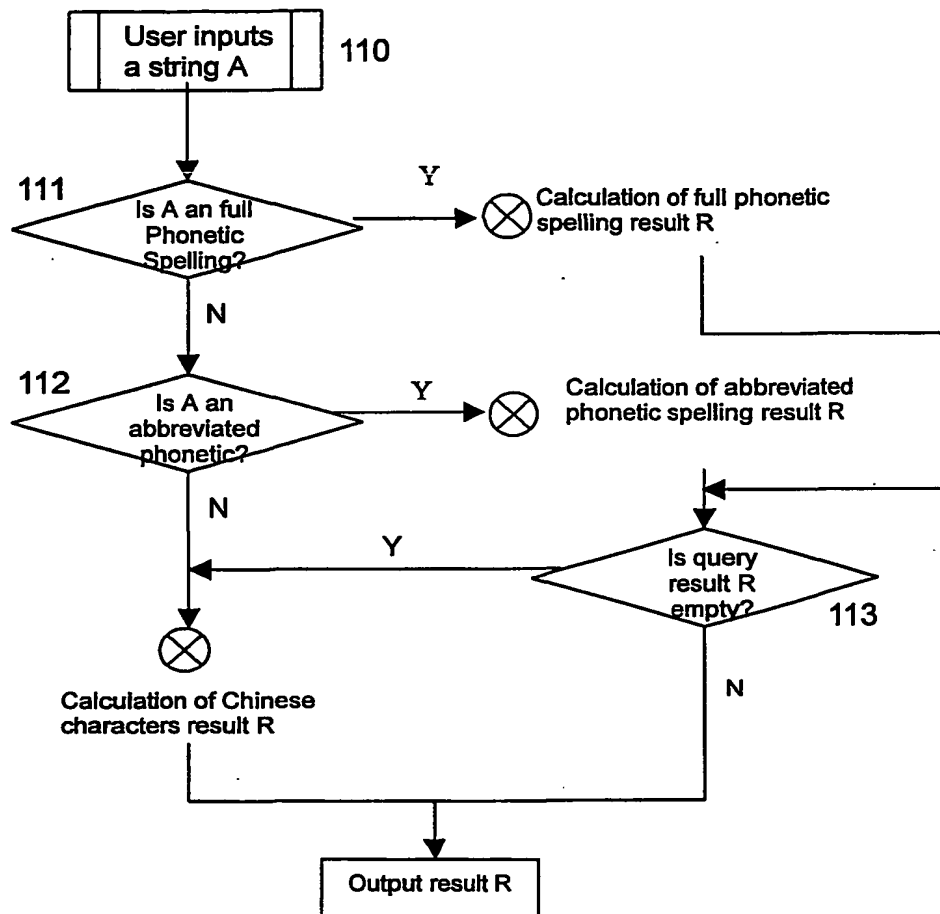


FIG. 11

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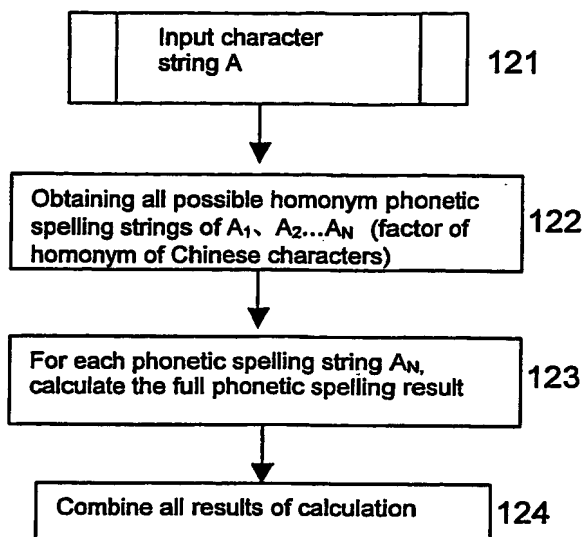


FIG. 12A

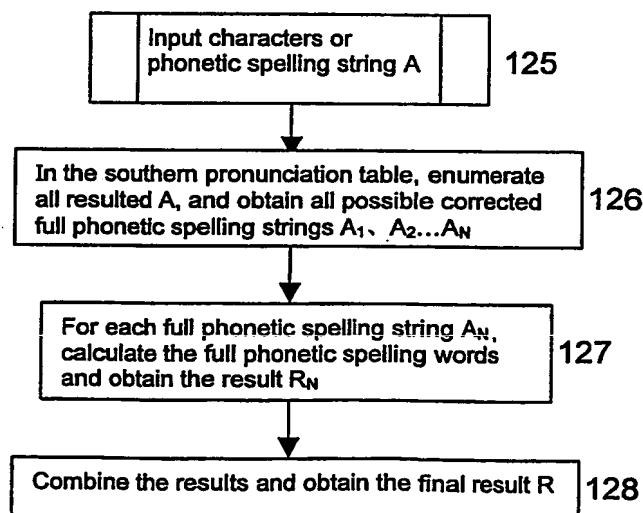


FIG. 12B

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 January 2002 (03.01.2002)

PCT

(10) International Publication Number
WO 02/01312 A2

(51) International Patent Classification⁷: **G06F**

(21) International Application Number: PCT/CN01/01062

(22) International Filing Date: 28 June 2001 (28.06.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/214,812 28 June 2000 (28.06.2000) US

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(74) Agent: **JEEKAI & PARTNERS**; Suite 602, Jinyu Tower, A129 West Xuan Wu Men Street, Beijing 100031 (CN).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

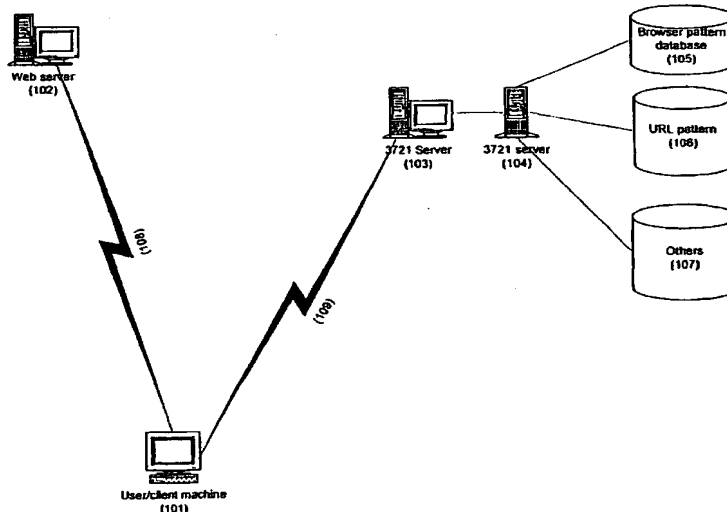
— of inventorship (Rule 4.17(iv)) for US only

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND SYSTEM OF INTELLIGENT INFORMATION PROCESSING IN A NETWORK



(57) Abstract: A method and system of intelligent information processing in the Internet comprises identifying whether an input is one of a URL address, English words, native language characters, and native language pronunciation notations. If the input is a regular URL, the system queries the input in a corresponding server through the Internet, and directly obtains the query result therefrom. If the input includes the native language pronunciation notations, the system parses the input against at least one phonetic spelling word list to find out corresponding Internet keyword, and then fetches a corresponding query result; and if the input includes characters of a native language, the system processes the input as a natural language input in a natural language table, and obtaining a desired Internet keyword, and fetches a corresponding query result of website URL.

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WO 02/01312 A3



(88) Date of publication of the international search report:
14 March 2002

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN01/01062

A. CLASSIFICATION OF SUBJECT MATTER

G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F17/30 G06F17/40

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI.EPODOC.PAJ:internet.address.character CNPAT:因特网.地址.字符

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages				Relevant to claim No.
N	CN1319814	31.Oct 2001	description page 3 to page 4	G06F17/30	1-18
A					2-17
A	CN1264070	23.Aug 2000	the whole document	G06F3/00	1-18
A	CN1255797	7.Jun 2000	the whole document	H04L29/06	1-18

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search
5.Dec 2001(5.12.01)

Date of mailing of the international search report
03 JAN 2002 (03.01.02)

Name and mailing address of the ISA/CN
6 Xitucheng Rd., Jimen Bridge, Haidian District,
100088 Beijing, China
Facsimile No. 86-10-62019451

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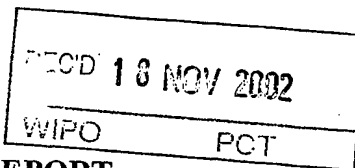
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TRANSLATION
10/069,415

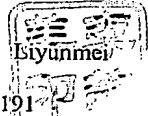
PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference EPS10651		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CN01/01062	International filing date (day/month/year) 28.Jun 2001(28.06.01)	Priority date (day/month/year) 28.Jun 2000(28.06.00)	
International Patent Classification (IPC) or national classification and IPC G06F17/30		RECEIVED FEB 12 2003	
Applicant INTER CHIAN NETWORK SOFTWARE COMPANY LIMITED et al		Technology Center 2100	
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and /or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>2</u> sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty ,inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2)with regard to novelty ,inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input checked="" type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application.</p>			
Date of submission of the demand 28.Jan 2002(28.01.02)		Date of completion of this report 20.Otc 2002(30.05.02)	
Name and mailing address of the IPEA/CN 6 Xitucheng Rd., Jimen Bridge, Haidian District, 100088 Beijing, China Facsimile No. 86-10-62019451		Authorized officer  Telephone No.86-10-62093191	

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/CN01/01062

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement:

Novelty (N)

Claims 1-19

YES

Claims

NO

Inventive step (IS)

Claims 1-19

YES

Claims

NO

Industrial applicability (IA)

Claims 1-19

YES

Claims

NO

2. Citations and explanations (Rule 70.7)

claims 1 to 19 meet the requirement of Articles 33(2)-(4) with respect to the prior art at hand.

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I. Basis of the report

1. With regard to the elements of the international application:

☐ the international application as originally filed☒ the description:

pages 1-17

, as originally filed

pages

, filed with the demand

pages

, filed with the letter of

☒ the claims:

Nos 2-17, 19

, as originally file

Nos

, as amended (together with any statement) under Article 19

Nos

, filed with the demand

Nos 1, 18

, filed with the letter of

15, July 2002

☒ the drawings:

sheets/fig 1-12

, as originally filed

sheets/fig

, filed with the demand

sheets/fig

, filed with the letter of

☐ the sequence listing part of the description:

pages

, as originally filed

pages

, filed with the demand

pages

, filed with the letter of

2. with regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☐ The amendments have resulted in the cancellation of:☐ the description, pages☐ the claims No. _____☐ the drawings, sheets/fig _____5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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PCT/CN01/01062

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
CN1319814A	31.Oct 2001	9.Aug 2000	28.Jan 2000

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)

CLAIMS

1. A method of intelligent information processing of the Internet keywords through an Internet keyword server, said method comprising the steps of:
 - a) identifying whether an input is one of a URL address, native language characters, and native language pronunciation notations;
 - b) if the input is a regular URL, querying the input through the Internet, and directly obtaining the query result;
 - c) if the input includes the native language pronunciation notations, parsing the input against at least one phonetic spelling word list to find out corresponding Internet keyword in the Internet keyword server, and then fetching a corresponding query result therefore; and
 - d) if the input includes characters of a native language, processing the input as a natural language input in a natural language table in the Internet keyword server, and obtaining a desired Internet keyword.
2. The method of claim 1, further comprising determination of whether the pronunciation notations are either full phonetic spelling words or abbreviations of first letters of phonetic spelling words, and if the input is a string of full phonetic spelling words, the input string is parsed in a full Chinese phonetic spelling word list with all possible combinations of meaningful words.
3. The method of claim 1, wherein after the entry of the query string in full phonetic spelling, the system parses the query string against a Full Chinese Pinyin Words List (FCPWL) and splits the query string into one or more Chinese phonetic spelling words, that is $W=\{W_1, W_2, \dots, W_N\}$; and for each word W_x in W , the system will parse query input in the FCPWL to find the attached Internet Keyword Entry Point List $IKEPL_x$, such that each node in $IKEPL_x$ will point to an Internet Keyword whose phonetic spelling containing W_x ; and then the system combines $IKEPL_1, IKEPL_2, \dots, IKEPL_N$ to obtain a

list, followed by limited number of results in R to obtain a final result Internet keywords list R.

18. A system of intelligent information processing of Internet keywords, comprising at least one Internet keyword server; and at least an Internet accessible device for inputting a query string of words; characterized by:
means for identifying whether an input of words is one of a URL address, native language characters, and native language pronunciation notations;
means for querying the input of URL through the Internet to obtain directly the query result if the input is a regular URL;
means for parsing the input against at least one phonetic spelling word list to find out corresponding Internet keyword in the Internet keyword server, and to fetch the query result if the input includes the native language pronunciation notations; and
means for processing the input as a natural language input in a natural language table in the Internet server to obtain a desired Internet keyword if the input includes characters of a native language.
19. The system of claim 18, further comprising means for checking whether the Chinese phonetic spelling words of the query input contain frequent misspellings due to the southern accent, and means for correcting the misspelled words automatically, and wherein after the determination of the query as correct phonetic spellings and correction of any misspelled words, means for querying the database carries out the search of related URLs.

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